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Rippling "instability" in granular jet impact is a memory effect NICHOLAS GUTTENBERG, WENDY ZHANG, JAKE ELLOWITZ, University of Chicago — Experiments and simulations of a dense granular jet impacting a target give rise to a collimated outflow despite the lack of cohesion in the system. This outflow eventually breaks up far away from the target. The breakup, however, is not a uniform dilution but rather takes the form of a series of wave-like undulations with a wavelength much larger than the grain scale. We investigate the possibility that this is another continuum hydrodynamic analog reproduced by bulk granular motion using 2D simulations. We find that these waves, unlike a Helmholz instability, cannot readily be nucleated by perturbations of the granular flow surface. Instead, we find that they point to relics of the velocity fluctuations caused by the impact itself. We show that the ripples are an effect of the effectively ballistic flow far from the target remembering these original velocity fluctuations.

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